

Worksheet 11: Oscillations

Name: _____

Due April 30, 2026

Partner: _____

Pencil only: use of Pen is forbidden.

As usual, turn your Excel document into the Google drive. Plots should use the class template, AND have proper axis labels, rational sig-figs on the axes, labels, a good trendline, etc.

I. Static measurement of vertical spring.

Measure y for $m = 100, 150, 200, \dots 400$ g.
Plot y vs. m .

Quantity	Units	Result
Slope		\pm
Computed k		\pm

II. Dynamic measurement of vertical spring.

Measure $10T$ for $m = 100, 150, 200, \dots 400$ g.
Plot T^2 vs. m .

Quantity	Units	Result
Slope		\pm
Computed k		\pm

III. Springs: dependence on amplitude.

Measure $10T$ for various x_0 .
Plot T vs. x_0 .

Quantity	Units	Result
Intercept		\pm
Average T		\pm

- Compare the agreement of the values of k from parts I and II. Which result is more believable?

- We normally wouldn't find the average of many values on a plot, like we did in part III. Why is it reasonable for this particular plot? How well does the average agree with the intercept?

IV. Pendulum: dependence on length.

Measure $10T$ for various L .
Plot T^2 vs. L .

Quantity	Units	Result
Slope		\pm
Computed g		\pm

V. Pendulum: dependence on mass.

Measure $10T$ for various m with $L = 50$ cm.
Plot T vs. m .

Quantity	Units	Result
Intercept		\pm
Average T		\pm
c_0 (from part VI)		\pm

VI. Pendulum: dependence on amplitude.

Measure $10T$ for various θ_0 with $L = 50$ cm.
Plot T vs. θ_0 .
Using θ_0 in radians, fit $T = c_0 + c_1\theta_0 + c_2\theta_0^2$.

Quantity	Units	Result
c_0		\pm
c_2		\pm
c_0 / c_2		\pm
Expected c_0 / c_2		\pm

- How significant is either mass or amplitude when determining the period of a pendulum? Your answers should be numeric rather than merely descriptive.
